

REMARKS

Re-examination and favorable reconsideration in light of the above amendments and the following comments are respectfully requested.

Claims 1 - 50 are pending in the application. Currently, no claim stands allowed.

By the present amendment, claims 1, 7, 10, 11, 15, 18, 25, 28, 33, 37 - 39, and 41 - 46 have been amended and claims 5, 6, 13, 22, 30 and 36 have been cancelled without prejudice.

In the office action mailed December 18, 2002, claims 1 - 50 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite; claims 1 - 3, 5 - 11, 13 - 17, 20 - 22, 24 - 27, 30, 32 - 40, and 42 - 43 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 3,503,721 to Lupfer; claims 1 - 18, 20 - 28, and 30 - 38 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,075,176 to Brinkmann; claims 1 - 5, 15 - 18, 20 - 24, 36 - 38, and 43 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,902,472 to Arai; claims 1 - 5, 7 - 18, 20 - 28, 30 - 31, 33 - 38, and 43 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,948,235 to Arai; claims 1 - 18, 20 - 28, 30 - 41, 46 - 47, and 50 were

rejected under 35 U.S.C. 102(b) as being anticipated by Japanese publication 2000-080460 to Harada; claims 1 - 11, 13 - 18, 20 - 22, 24 - 28, 30, and 32 - 41 were rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Publication No. 2002/0134200 to Nishimura; and claims 1 - 50 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Brinkmann patent in view of applicant's disclosure of the prior art.

The foregoing rejections are traversed by the present response.

With regard to the rejection on indefiniteness grounds; it is believed that the position taken by the Examiner is incorrect. The word "essentially" has a meaning which has been ignored by the Examiner and which does not include there being substantial amounts of additional constituents. However, rather than argue this point and delay issuance of a patent by having to go to the Board of Appeals, the claims have been amended to remove the word "essentially" from the balance limitation. With regard to the other objection raised by the Examiner, a purpose has been added to the phrase "an effective amount". It is submitted that the rejection on indefiniteness grounds has been obviated by these amendments.

With regard to the rejection over Lupfer, it is submitted that Lupfer does not teach or suggest the subject matter of independent claims 1, 7, 15, 25, and 39. Lupfer relates to a dip soldering technique wherein the dip solder is formed from binary tin-silver compositions which may include 2 to 10% silver. Lupfer does not teach or suggest the hardness limitations set forth in claims 1, 7, 15, and 25. This is because solders have much lower hardnesses than coatings formed using the process of the present invention. For example, a 95% tin - 5% silver coating formed in connection with the present invention will have a hardness of 0.36 GPa, while a 95% tin - 5% silver solder will have a hardness of 0.032 GPa - an order of magnitude lower. The same would hold true for a 90% tin - 10% silver coating vs. a 90% tin - 10% silver solder and a 98% tin - 2% silver coating vs. a 98% tin - 2% solder coating. Thus, the Examiner's inherency argument fails. Claims 7, 15, and 25 are further allowable because Lupfer does not form a coating with the claimed compositions. With regard to the claims which depend from claims 1, 7, 15, and 25, these claims are allowable for the same reasons as their parent claims as well as on their own accord. As for claim 39, this claim is allowable because Lupfer fails to teach or suggest the claimed temperature maintaining step. Articles

which are dip soldered using Lupfer's molten solder bath are dip soldered at a temperature below 221 degrees Centigrade (428 degrees Fahrenheit). The claims which depend from claim 39 are allowable for the same reasons as claim 39 as well as on their own accord.

With regard to the anticipation rejection over Brinkmann, it is submitted that Brinkmann does not teach or suggest the subject matter of independent claims 1, 7, 15, and 25. Brinkmann relates to an electrical connector pair with a male plug being given a tin alloy coating. The tin alloy coating may contain lead, as well as small amounts of deoxidization and processing additives and up to 10 wt% by weight of at least one element selected from the group consisting of silver, aluminum, silicon, copper, magnesium, iron, nickel, manganese, zinc, zirconium, antimony, rhodium, palladium, and platinum. On its surface, it would appear that Brinkmann teaches a binary tin-silver alloy; however, it does not. There is nothing in this reference which would teach one of ordinary skill in the art to select silver from the laundry list of possible candidates and form a binary coating system. In fact if one looks at the examples in Brinkmann, the tin-silver alloy systems used by Brinkmann contain 4.0% or less silver in combination with phosphorous and/or other constituents.

Also see claim 4 of the patent. If one reads the summary in Brinkmann, it is clear that alloy contains tin, optionally lead, small amounts of deoxidization and processing additives, such as phosphorous, and up to 10 wt% total of at least one element. It is submitted that Brinkmann does not enable the coating compositions of claims 1, 7, 15, and 25. Further, Brinkmann does not enable one to form compositions with the hardness set forth in the claims. To form compositions with the claimed hardness, one would have to select the right elements and process them in the appropriate manner. Brinkmann provides no guidance on either of these points. For these reasons, claims 1, 7, 15, and 25 are allowable. With regard to the claims that depend from claims 1, 7, 15, and 25, these claims are allowable for the same reasons as their parent claims as well as on their own accord.

With regard to the anticipation rejection over Arai '472, it is submitted that Arai does not teach or suggest the subject matter of independent claims 1, 7, 15, and 25. Arai '472 relates to a tin-silver alloy plating solution having a tin compound, a silver compound, and a complexing agent including a pyrophosphoric compound and an iodic compound. The solutions can be used to form electroplated coatings which include 2 - 75% silver. Electroplating can

be carried out at temperatures in the range of 20 to 80 degrees Centigrade. Claim 1 is allowable because Arai '472 does not teach or suggest forming a non-electroplated coating having the claimed composition and hardness. Claims 7, 15 and 25 are allowable for the same reasons. with regard to the claims which depend from claims 1, 7, 15, and 25, these claims are allowable for the same reasons as their parent claims as well as on their own accord.

With regard to the anticipation rejection over Arai '235, it is submitted that Arai does not teach or suggest the subject matter of independent claims 1, 7, 15, and 25. Arai '235 relates to a tin-silver-system alloy electroplating solution comprising the following ingredients (a) a tin compound, (b) a silver compound, (c) at least one member selected from a group consisting of bismuth compounds, (d) a pyrophosphoric compound, and (e) an iodic compound. The solutions may be used to plate an alloy layer having 83% tin, 3.5% silver and 13.5% bismuth or an alloy layer having 94% tin, 5% silver, and 1.0% copper. Temperature during the electroplating is in the range of 20 to 80 degrees Centigrade. It is submitted that claim 1 is allowable because there is no teaching or suggestion of the binary tin-silver, non-electroplated coating of claim 1. Claims 7, 15, and 25 are allowable

because there is nothing in Arai '235 which teaches or suggests the claimed hardness limitations. Claims 7, 15, and 25 are further allowable in that they call for non-electroplated coatings. Claim 39 is allowable because Arai '235 does not teach or suggest the bath preparing step and/or the bath temperature maintaining step. With regard to the remaining claims in the application, they are allowable for the same reasons as their parent claims as well as on their own accord.

With regard to the anticipation rejection over Harada, it is submitted that Harada does not teach or suggest the subject matter of independent claims 1, 7, 15, 25, 39, and 46. Harada relates to a tin-silver-copper alloy soldered wire with a hot dip soldering layer composed of 0.5 to 10% silver, 0.01 to 2.0% copper, and the balance tin. There is no teaching or suggestion of the binary tin-silver coating and/or the hardness set forth in claim 1, the hardness of claims 7, 15 and 25, the bath composition of claim 39, and/or the bath temperature maintaining step of claim 46. The remaining claims in the application are allowable for the same reason as their parent claims as well as on their own accord.

With regard to the anticipation rejection over Nishimura, it is submitted that Nishimura does not teach or

suggest the subject matter of independent claims 1, 7, 15, 25, and 39. This patent relates to the use of a molten solder bath containing tin, nickel, and copper as the major constituents thereof. In one embodiment the solder bath also contains about 3.5% silver. The patent publication is entirely silent as to the nature of any solder which is used to join two parts together and the physical properties of such solder. Consequently, Nishimura does not teach or suggest the tin-silver coating of claim 1 having the claimed hardness; the coating material of claim 7; the composite of claim 15 having the claimed composition and the claimed hardness; the composite of claim 25; and the bath composition used in the process of claim 39. The claims which depend from independent claims 1, 7, 15, 25, and 39 are allowable for the same reason as their parent claims as well as on their own accord.

With regard to the rejection of claims 1 - 50 over Brinkmann in view of Applicant's disclosure of the prior art, the above-stated comments about Brinkmann are hereby repeated. Brinkmann simply does not enable one of ordinary skill in the art to make the invention set forth in claims 1, 7, 15, and 25. With regard to the process claims, Brinkmann does not teach forming the claimed bath compositions, maintaining the baths at the claimed

temperatures during immersion, and/or the claimed residence times.

The alleged disclosure of prior art by Applicant does not cure these deficiencies in Brinkmann. As for applying the coatings of the present invention to copper-tellurium, there is nothing in Brinkmann which would teach or suggest such a combination. Applicant has not made any admission that applying a tin-silver coating to copper tellurium is well known in the prior art. In this regard, the Examiner's rejection of the copper-tellurium claims is not well grounded.

With regard to the bath dwell times and the use of lubricants, the Examiner is hereby requested to provide applicant with prior art references which teach or suggest these limitations. This should not work a great hardship since the Examiner states these are conventional in this field of manufacture. Absence the citation of such references, then the claims should be allowed.

New claim 51 is believed to be allowable because none of the cited and references teach or suggest the combination of elements set forth therein.

For the above reasons, the instant application is believed to be in condition for allowance. Such allowance is respectfully solicited.

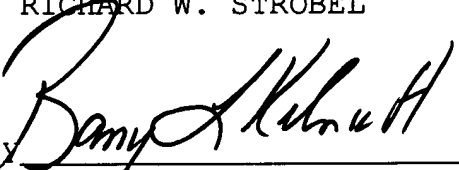
Should the Examiner believe an additional amendment is needed to place the case in condition for allowance, he is invited to contact Applicant's attorney at the telephone number listed below.

A check in the amount of \$84.00 is enclosed herewith to cover the cost of an extra independent claim. Should the Commissioner determine that a fee is due, he is hereby authorized to charge said fee to Deposit Account No. 02-0184.

Respectfully submitted,

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Date: March 17, 2003

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, DC 20231

on March 17, 2003

(Date of Deposit)

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Name and Reg. No. of Attorney

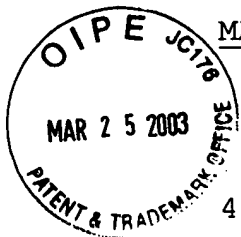


Signature

March 17, 2003

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MARKED-UP VERSION OF AMENDED CLAIMS



Claims 1, 7, 10, 11, 15, 18, 25, 28, 33, 37 - 39, and

41 - 46 have been amended as follows:

1. (Amended) A coating to be applied to an electrically conductive material, said coating being non-electroplated, consisting of more than 1.0 wt% to about 20 wt% silver and the balance [essentially] tin [and], having a melting point greater than 225°C, and a hardness in the range of from 0.32 to 0.41 GPa.

7. (Amended) A coating material consisting of more than 1.0 wt% to 20 wt% silver, [an effective amount up to about 5.0 wt% of] at least one [element] addition selected from the group consisting of bismuth, silicon, copper, magnesium, iron, [nickel,] manganese, zinc, and antimony in an amount effective to increase coating hardness up to 5.0 wt%, and the balance [essentially] tin, said coating material being non-electroplated and having a hardness in the range of from 0.32 GPa to 0.41GPa.

10. (Amended) A coating material according to claim 7, wherein said at least one [element] addition is present in

an amount which does not cause the formation of deleterious oxides.

11. (Amended) A coating material according to claim 10, wherein said at least one [element] addition is present in an amount ranging from 0.1 wt% to said amount which does not cause the formation of deleterious oxides.

15. (Amended) A composite comprising a substrate material and a non-electroplated layer of coating material on at least a portion of said substrate material and said coating material consisting of more than 1.0 wt% to about 20 wt% silver, copper in a range from 0.1 wt% to 5.0 wt%, and the balance [essentially] tin and having a hardness in the range of from 0.32 to 0.41 GPa.

18. (Amended) A composite according to claim 15, wherein said substrate material comprises [a ferrous based material or] a non-ferrous based material.

25. (Amended) A composite comprising a substrate material and a nom-electroplated layer of coating material over at least a portion of said substrate material, and said coating material consisting of more than 1.0 wt% to about

20 wt% silver, [an effective amount up to at least 5.0 wt% of] at least one [element] addition selected from the group consisting of bismuth, silicon, copper, magnesium, iron, [nickel,] manganese, zinc, and antimony in an amount effective to increase coating hardness up to at least 5.0 wt%, and the balance [essentially] tin, and having a hardness in the range of from 0.32GPa to 0.41GPa.

28. (Amended) A composite according to claim 25, wherein said substrate material is formed from a non-ferrous based material [or a ferrous based material].

33. (Amended) A composite according to claim 25, wherein said at least one [element] addition is present in an amount from 0.1 wt% up to an amount which does not create deleterious oxides.

37. (Amended) A process according to claim [36] 39, wherein said preparing step comprises preparing a bath containing from 2.0 wt% to 15 wt% silver and the balance [essentially] tin.

38. (Amended) A process according to claim [36] 39, wherein said preparing step comprises preparing a bath containing from 3.0 wt% to 10 wt% silver.

39. (Amended) A process [according to claim 36, further] for coating a substrate material comprising the steps of:

providing a substrate material to be coated;

preparing a bath consisting of more than 1.0 wt% to about 20 wt% silver and the balance tin;

immersing said substrate material in said bath to form a coating layer on said substrate material, which coating layer consists of more than 1.0 wt% to about 20 wt% silver;
and

maintaining said bath at a temperature greater than 500°F during said immersing step.

41. (Amended) A process according to claim [36] 39, wherein said immersing step comprises continuously passing said substrate material through said bath.

42. (Amended) A process according to claim [36] 39, wherein said immersing step comprises discontinuously passing said substrate material through said bath.

43. (Amended) A process according to claim [36] 39, wherein said immersing step comprises immersing a batch of said substrate material into said bath and maintaining said batch within said bath for a time period sufficient to form said coating.

44. (Amended) A process according to claim [36] 39, further comprising keeping said substrate material resident in said bath for a time period in the range of 0.2 seconds to 10 seconds.

45. (Amended) A process according to claim [36] 39, further comprising applying a lubricant to surfaces of said substrate material after said immersing step.

46. (Amended) A process for forming a non-electroplated coating on a substrate material comprising the steps of:

preparing a bath consisting of more than 1.0 wt% to about 20 wt% silver, [an effective amount up to about 5.0

wt% of] at least one [element] constituent selected from the group consisting of bismuth, silicon, copper, magnesium, iron, nickel, manganese, zinc, and antimony in an amount sufficient to increase coating hardness and up to 5.0 wt%, and the balance [essentially] tin; and

maintaining said bath at a temperature of at least 500°F; and

immersing said substrate material in said bath for a resident time period of from 0.2 to 10 seconds.